Role of the National Metallurgical Laboratory, Jamshedpur, India, in the Field of Non-ferrous Metallurgy

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National Metallurgical Laboratory at Jamshedpur, India, is one of the 32 national laboratories, established in 1950, under the Council of Scientific and Industrial Research, New Delhi, which is the central controlling organization. The council of Scientific and Industrial Research is independent, quasi-government body financed mainly by the government.

Each laboratory has its own executive management body to decide the general policy of research and other activities under the general frame work of C. S. I. R.

The function of National Metallurgical Laboratory is to carry out both ferrous and non-ferrous research activities, to help the existing industries and also to test and develope technical knowhow as applied to metallurgical processes on the basis of various raw materials available in India.

Both fundamental and applied studies are carried out with more emphasis on applied industrial research.

The laboratory has twelve major divisions:

1) General Metallurgy, 2) Chemistry, 3) Ore Dressing, 4) Refractories, 5) Extractive Metallurgy, 6) Low Shaft Blast Furnace, 7) Physical Metallurgy, 8) Iron and Steel, 9) Alloy Steel, 10) Mechanical Metallurgy and Testing, 11) Design and Development, 12) Liaison and Information

and four service divisions, of which Electronics, Mechanical and Electrical have also separate sections to carry out equipment development work:

1) Electronics Engineering, 2) Mechanical Engineering, 3) Electrical Engineering, 4) Civil Engineering

with a Central Library. Each section is headed by one scientist. In addition there are six integrated pilot plants:

1) Low Shaft Blast Furnace, 2) Mineral Dressing, 3) Submerged Arc Electric Furnace for Ferro-alloys, 4) Refractory Materials, 5) Electrolytic Mn and MnO_2 Plant, 6) Hot Air blown Cupola

and seven semi pilot plants:

1) Electric Arc Furnaces, 2) Side blown Converter, 3) Vacuum Melting and Casting Furnace, 4) Aluminizing of Wires, 5) Thermal Magnesium Unit, 6) Vanadium Pentaoxide, 7) Synthetic Cryolite

Further, there are 3 regional foundry laboratories, and one marine corrosion testing laboratory, all working under the National Metallurgical Laboratory.

According to the nature of work on non-ferrous metallurgy the studies are jointly or separately handled by different divisions.

The beneficiation and testing procedure to be adopted for minerals and ores are taken care of by Mineral Dressing section. The metal extraction processes under pyro, hydro and vacuum metallurgy are carried out by Extractive Metallurgy division. All works on electro-chemistry are handled by Chemistry division. Developments of non-ferrous alloys are under General Metallurgy division. Physical properties of metals and alloys are jointly carried by Physical Metallurgy and Mechanical Metallurgy divisions. Study on super pure metals is also under Physical Metallurgy division. India has abundant resources of ores and minerals in the decending order for Mn, Al, Mg, Cr, Ti, Pb, Cu, Zr, Be, and atomic energy materials; very little Zn, negligible Ni and no Sn. But only 3 major non-ferrous industries are present viz. Al, Pb and Cu. Tests are being carried out at the laboratory to utilize different ores and minerals for aluminum, copper and lead. The results are handed out to industries through National Research and Development Council. Production technique developed by the laboratory are often tested in pilot plant scale for industrial development viz. utilization of low grade Mn ore for production of Mn metal and MnO_2, for which one ton per day units of each are being operated. Ni-free stainless steel as developed by the laboratory used the Mn-metal produced at the pilot plant. To minimize the imports of Cu, Pb, Zn, Sn, Ni, Mg, as pure metals and alloys, substitution studies by other available metals and alloys have also been carried out. The successful development of the new coinage alloy, aluminizing of wire and other articles, new bearing alloys and other non-ferrous alloys viz. heating elements, synthetic preparation of cryolite etc. are the few examples. The physical properties including the corrosion tests of these products are thoroughly investigated in the laboratory.

The laboratory has also developed production technique for Al, Mg, Ti, Zr, Be, Cr, and Si from the raw materials available in India, and also render active help to the industries in modified alloy plating technique, recovery and refining of secondary metals.

Total staff is around 1200 men and women, in the laboratory.

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